Heliyon 10 (2024) e37764

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Review article

Pharmacist-led interventions in addressing improper disposal practices of unused and expired household medication: A systematic review

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ARTICLE INFO

Keywords:
Medication disposal
Pharmacist-led interventions
Unused and expired household medication

ABSTRACT

Background: Improper household medication disposal practices are a source of significant threat to environmental safety and public health. Pharmacists play a crucial role in mitigating these risks by educating the public about proper medication disposal. Evidence regarding the effectiveness of efforts conducted by health professionals to reduce the risks associated with improper disposal practices is still lacking. Therefore, this study aimed to systematically review pharmacist-led interventions in addressing unused and expired household medication disposal.

Method: A comprehensive literature search was conducted using PubMed, Scopus, and Google Scholar databases to identify studies evaluating pharmacist-led interventions and the effectiveness in improving household medication disposal practices until January 2024 with no constraints on publication year. Two reviewers independently performed the study selection process, data extraction, and outcomes assessment. Subsequently, the entire collected data were extracted and synthesized using qualitative and quantitative methods.

Results: The results showed that two among the total 83 studies retrieved during the search process met the inclusion criteria. The identified pharmacist-led interventions included the provision of an at-home medication disposal kit and an informational handout on proper disposal. However, these interventions showed no significant effects in improving household medication disposal practices, and all studies reported a low engagement rate with interventions.

Conclusion: The systematic review identified limited literature on pharmacist-led interventions for unused and expired household medication disposal practices, with no observed significant effects. Active patient and pharmacist engagement were required to enhance the effectiveness of interventions. Furthermore, the included limited studies suggested the need for the development of

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https://doi.org/10.1016/j.heliyon.2024.e37764
Received 12 February 2024; Received in revised form 9 September 2024; Accepted 9 September 2024
Available online 11 September 2024

more pharmacist-led interventions to facilitate the role of pharmacist in educating the public on proper household medication disposal.

1. Introduction

Pharmaceutical waste is common in a majority of countries [1] due to the increased daily use of pharmaceutical products. In this context, factors contributing to the excessive accumulation of unused medication include a change or discontinuation of treatment regimen, non-adherence, adverse effects, and overprescription [2]. However, unused and expired household medication is often discarded in garbage bins and sinks or flushed down a toilet [3,4]. A study in Jeddah reported that 91.57 % of the participants disposed of expired medication by discarding it along with household waste [5]. According to 76.5 % in Kuwait [6], the most common disposal method was throwing medication in the garbage, followed by flushing down the toilet (11.2 %). In Indonesia [7], more than 80 % of participants reported that the most popular method of discarding unused medication was disposal in household garbage. These prevalent practices may be attributed to the lack of awareness of the risks associated with improper disposal [8] and insufficient access to appropriate disposal options [9].

The improper disposal of household medication poses significant risks to human health and the environment [10]. For example, some drinking water supplies have been identified to contain microscopic levels of antidepressants, hormone replacement treatment residues, and antibiotics [11,12]. The contamination can have serious consequences, including environmental toxicity as biologically active substances enter the food chain, leading to potential adverse effects on the human population [10]. The presence of antibiotics in the drinking water systems contributes to the development of antibiotic resistance, posing a serious health threat [11]. However, previous systematic review focusing on interventions for disposal of general medication [13] and opioids [14] have identified limited literature as well as conflicting results regarding the effectiveness [13,14]. Studies exploring the impact of healthcare professional-led interventions on medication waste disposal are lacking [13].

Pharmacists play an essential role in educating the public about the proper disposal of unused and expired household medication to minimize the environmental effects [15]. The public often views and trusts pharmacists as the primary healthcare professionals responsible for raising awareness about safe medication disposal practices [15–17]. However, the majority of previous studies showed that pharmacists provide inconsistent or occasional information about medication disposal [18–20]. In a previous investigation, only 21 % of 517 participants reported receiving education about medication disposal from pharmacists [21]. A high number of pharmacists are unaware of the variety of strategies that can be used to reduce medication waste in the supply chain [22]. Consequently, interventions conducted by these professionals are limited among the general public [3,23–25], leading to the need for increased guidance to minimize environmental damage [16]. Several previous systematic review did not focus on pharmacist-led interventions and the effectiveness as a key outcome measure. Therefore, this study aimed to systematically review pharmacist-led interventions in addressing unused and expired household medication disposal.

2. Method

This study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guideline [26] (Appendix 1).

2.1. Information sources and search strategy

A comprehensive literature search for past studies until January 2024 was conducted in the PubMed, Scopus, and Google Scholar databases, without any restriction on publication year. This observation was supplemented by reviewing the reference list of included articles. The search terms were developed using the PICO mnemonic, namely Participants (patients at home), Interventions (all interventions for unused and expired household medication disposal practices led by pharmacists), Comparison (all controls), and Outcomes (improvement in proper unused and expired household medication disposal practices). The full searching strategy adopted a combination of medical subject heading terms and text words, as presented in Appendix 2.

2.2. Eligibility criteria

The inclusion criteria comprised paid (subscription) or free (open access) experimental studies published in English, with a focus on pharmacist-led interventions and the effects on managing unused and expired household medication disposal practices. Experimental studies were reviewed due to being considered the gold standard for evaluating the effectiveness of interventions. Unused and expired household medication was predefined as those unrequired any longer and needing appropriate disposal [2]. Meanwhile, exclusion criteria consisted of conducted studies describing or assessing the use of interventions in case reports without measuring the effects, as well as lacking comparison groups and full-text availability. Additionally, commentaries, letters to the editor, and editorials were excluded because of the tendency to reflect individual opinions or responses to previous publications, compared to presenting original investigations. Study protocols and abstracts from conference proceedings were excluded due to lacking rigor and comprehensive data necessary for systematic review.